

Application No.: 10/783,592
Attorney Docket No.: CFA00054US

REMARKS

Summary of the Amendment

Upon entry of the present Amendment, Claim 3 will have been amended; Claims 1-2 and 4-7 will have been cancelled, and new Claim 8 will have been added.

Summary of the Office Action

Claim 3 has been rejected under 35 U.S.C. § 102(b) as being anticipated by art of record.

Traversal of Rejection under 35 U.S.C. § 102(b)

Claim 3 is rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Publication No. 20002/0000514 A1 to Haas et al. [hereinafter "HAAS"].

With regard to Claim 3, the Examiner submits that HAAS shows in Fig. 1A an optical encoder comprising a scale having an optical grating; a plurality of photoreceptor elements that are movable relatively with respect to the scale and that are disposed in relation to the pitch of the optical grating (submitting that when the grid disk (2) is stationary, laser diodes (11) and (12) emit pulses at the same intensity; however, when grid disk is in motion one of the laser diodes is shadowed by grid disk (2) thus altering the light emitting position of the laser diodes); a light source (1, i.e., emission device) having at least two light portions (11 and 12, i.e., laser diodes) which irradiate the photoreceptor elements (elements within photoreceiver (3)) through the scale (2, i.e., grid plate) from at least two different directions; and a controller (combination of control device (7) and evaluation circuit (4)) which changes the light-emitting intensity of the at least two light portions respectively; wherein the controller obtains relative-position information of the scale and the photoreceptor elements based on the intensity of the light portions and signals obtained before and after the light-emitting intensity of the light portions is changed (since evaluation circuit (4) determines speed and length of movement, if grid disk (2) is stationary, there is no modulation frequency when grid disk 92) is stationary which indicates no change in relative position (paragraph [0027], lines 4-7, and [0029], lines 1-9).

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In re HAAS et al.:

HAAS discloses a method for a quantitative detection of linear movement or rotary movement. The method includes the steps of emitting radiation from at least two light emitters in a pulsed mode at a same clock frequency or different clock frequencies and detecting the radiation from the two light emitters by a detection device. It furthermore includes the steps of increasingly shadowing the radiations by a movable grid device or separating signals originating from different light emitters by an evaluation circuit coupled to the detection device.

It is further noted that HAAS discloses an optical encoder technology to obtain the two-phase signals which are phase-shifted through 90 degrees by using two light-emitting elements and the photoreceptor element. Thus, it appears HAAS uses the plurality of light-emitting elements while switching them instead of providing a plurality of sensors.

Aspects of the Present Invention:

One aspect of the present invention is to provide an optical encoder with further enhanced resolution than a conventional encoder by using signals having different phases which are obtained before and after switching a plurality of light-emitting elements.

Another aspect of the present invention is to obtain signals having a phase A and phase B by using a plurality of photoreceptor elements and also to obtain more precise position information by processing signals which are phase-shifted from the above two-phase signals and obtained by switching the light source.

Moreover, another aspect of the present invention is that the phase difference can fill the gap, therefore, the present invention can obtain precise signals which the 90 degrees phase difference is further resolved into.

Independent Claim 3:

As amended, Applicant's independent Claim 3 now recites, *inter alia*, . . .

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a controller which changes the balance of light-emitting intensity between at least the two light portions respectively; wherein the controller obtains relative-position information of the scale and the photoreceptor elements based on the balance of light-emitting intensity between the light portions and on the signals obtained before and after the change of the balance.

On the other hand, HAAS does not teach the aforementioned features. Rather HAAS discloses encoding technology for obtaining two-phase signals with a 90 degrees phase shift by using two light emitters and one photoreceptor. Instead of adopting a plurality of sensors, HAAS utilizes a plurality of switched light emitters.

According to the present invention, A, B phase signals are obtained by using a plurality of photoreceptors. Furthermore, a signal out of phase with the two-phase signals is obtained by switching a light source and the signal is processed such that more precise position information can be obtained. Moreover, the phase difference of two signals before and after the change of a light source is smaller than 90 degrees. As such, the phase difference enables the present invention to obtain a precise signal with the phase difference of 90 degrees being further dispersed.

Therefore, HAAS does not disclose or suggest changing the intensity of a plurality of light sources together or the balance and computing an amount of displacement of a scale and light emitters based on an output signal before and after the change. And because HAAS fails to disclose the above-noted features of the present invention, Applicant respectfully submits that HAAS fails to disclose each and every feature of the present invention as recited in independent Claim 3.

Accordingly, Applicant submits that the Examiner has failed to provide an adequate evidentiary basis to support a rejection of Claim 3 under 35 U.S.C. § 102(b) and that the rejection of independent Claim 3 is improper and should be withdrawn.

Newly Submitted Claim 8 is Allowable

Independent Claim 8:

Applicant's newly submitted independent Claim 8 recites, *inter alia*, . . . a controller which changes the light-emitting intensity of the light portions together;

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wherein the controller obtains relative-position information of the scale and the photoreceptor elements based on the balance of light-emitting intensity difference of the light portions and signals obtained before and after the change of the light-emitting intensity.

For similar reasons discussed above (*see supra*), Applicant submits that HAAS fails to disclose the above-noted features of the present invention. Thus, Applicant submits that HAAS fails to disclose each and every feature of the present invention as recited in independent Claim 8. Accordingly, Applicant respectfully submits that Claim 8 is also allowable.

Application is Allowable

Applicant respectfully submits that each and every pending claim of the present invention meets the requirements for patentability and respectfully requests the Examiner to indicate allowance of each and every pending claim of the present invention.

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CONCLUSION

Applicant respectfully submits that each and every pending claim of the present application meets the requirements for patentability under 35 U.S.C. §§ 112, 101, 102 and 103, and respectfully requests that the Examiner indicate the allowance of such claims.

Further, any amendments to the claims which have been made in this response and which have not been specifically noted to overcome a rejection based on the prior art, should be considered to have been made for a purpose unrelated to patentability, and no estoppel should be deemed to attach thereto.

Should there be any questions or comments, the Examiner is invited to contact the undersigned at the below-listed telephone number.

Respectfully submitted,

Date:

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